CLAIMS

1. A method of measuring optical radiation with a spectrometer, the method comprising illuminating an entrance slit (104, 204, 232, 308, 500, 600) of the spectrometer with optical radiation; imaging the entrance slit (104, 204, 232, 308, 500, 600) to an optical modulator (108, 210, 238, 318, 406, 510, 604); dispersing the entrance slit (104, 204, 232, 308, 500, 600) image into a spectrum with a dispersive component (106, 2062, 312, 401, 504, 601); modulating the spectrum with the optical modulator, the spectrum being composed into a measurement signal, which is measured by the spectrometer, with the dispersive element (106, 2062, 312, 401, 504, 605), **characterized** by

imaging the entrance slit (104, 204, 232, 308, 500, 600) to an optical DMD modulator (108, 210, 238, 318, 406, 510, 604), which comprises modulating micromirror elements;

dispersing the entrance slit (104, 204, 232, 308, 500, 600) image into a spectrum with the dispersive component (106, 2062, 312, 401, 504, 601) so that each wavelength of the spectrum forms an image of its own from the entrance slit (104, 204, 234, 308, 500, 600), the place of the image on the micromirror elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) depending on the wavelength;

modulating the dispersed entrance slit (104, 204, 232, 308, 500, 600) image with at least one micro mirror element of the optical DMD modulator (108, 210, 238, 318, 406, 510, 604), in which case at least one wavelength band modulated from the entrance slit (104, 108, 232, 308, 500, 600) image is formed;

directing at least one modulated wavelength band to the dispersive component (106, 2062, 312, 401, 504, 605), which composes non-dispersive measurement radiation from at least one modulated wavelength band so that when the image is formed at all different wavelengths, the entrance slit (104, 204, 232, 308, 500, 600) images are formed in the same place regardless of the wavelength;

imaging the entrance slit (104, 204, 232, 308, 500, 600) to an exit slit (104, 214, 242, 322, 514) by means of non-dispersive measurement radiation; and

detecting, for spectrum measurement, the measurement radiation obtained from the exit slit (104, 214, 242, 322, 514) with one detector (110,

216, 244, 326, 424), which converts the measurement radiation into an electrical measurement signal; and demodulating the electrical measurement signal to separate signal components formed by different wavelength bands from one another and measuring at least one wavelength band with at least one signal component.

2. A method according to claim 1, **characterized** by illuminating the entrance slit (104, 204, 232, 308, 500, 600) with optical radiation emitted by a sample (102, 202, 230, 304).

3. A method according to claim 1, **characterized** by illuminating the sample (102, 202, 230, 304) with measurement radiation and imaging the entrance slit (104, 204, 232, 308, 500, 600) to the exit slit (104, 214, 242, 322, 514) by means of the measurement radiation emitted by the sample (102, 202, 230, 304).

4. A method according to claim 1, **characterized** by modulating optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time by modulating different wavelength bands with different waveforms and separating different wavelength bands from one another during measurement by demodulation corresponding to the modulation.

5. A method according to claim 1, **characterized** by modulating optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time by multiplexing different wavelength bands using time division and separating different wavelength bands from one another during measurement by demodulation corresponding to the modulation.

6. A method according to claim 1, **characterized** by modulating optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time by multiplexing different wavelength bands using frequency division and separating different wavelength bands from one another during measurement by demodulation corresponding to the modulation or by filtering the frequencies apart from one another.

7. A method according to claim 1, **characterized** by modulating optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time by multiplexing different wavelength bands using code division and separating different wavelength bands

from one another during measurement by demodulation corresponding to the modulation.

8. A method according to claim 1, **characterized** in that only one dispersive component (106, 2062, 312, 401, 504, 601) is used in the measurement.

9. A method according to claim 1, **characterized** by determining the concentration of at least one substance in the sample (102, 202, 230, 304) by means of at least one measured wavelength band.

10. A method according to claim 1, **characterized** by determining the thickness of a substance layer in the sample (102, 202, 230, 304) by means of at least one measured wavelength band.

11. A method according to claim 1, **characterized** by determining the sample (102, 202, 230, 304) temperature by means of at least one measured wavelength band.

12. A method according to claim 1, **characterized** in that the detector (110, 216, 244, 326, 424) forms the exit slit (104, 214, 242, 322, 514).

13. A method according to claim 1, **characterized** in that the spectrometer is produced for an integrated circuit.

14. A method according to claim 1, **characterized** in that the spectrometer has been produced using a plane waveguide, LIGA technique and moulded plastic optics.

15. A spectrometer for measuring an optical spectrum, the spectrometer comprising an entrance slit (104, 204, 232, 308, 500, 600), at least one dispersive component (106, 2062, 312, 401, 504, 601, 605), at least one imaging component (106, 206, 234, 314, 402, 506, 516, 602, 606), an optical modulator (108, 210, 238, 318, 406, 510, 604) and an exit slit (104, 214, 242, 322, 514); and

the entrance slit (104, 204, 232, 308, 500, 600) in the spectrometer is arranged to limit the amount of optical radiation entering the spectrometer;

the imaging component (106, 206, 234, 314, 402, 506, 516, 602) is arranged to image the entrance slit (104, 204, 232, 308, 500, 600) to the optical modulator (108, 210, 238, 318, 406, 510, 604);

at least one dispersive component (106, 2062, 312, 401, 504, 601) is arranged to form a spectrum of the entrance slit (104, 204, 232, 308, 500, 600) image, the modulator (108, 210, 238, 318, 406, 510, 604) being arranged

to modulate the spectrum and to compose measurement radiation of the modulated spectrum;

the spectrometer is arranged to measure measurement radiation from the exit slit (104, 214, 242, 322, 514), **c h a r a c t e r i z e d** in that

the spectrometer comprises only one detector (110, 216, 244, 326, 424) and the optical modulator is a DMD modulator, which comprises micromirror elements, and

the dispersive component (106, 2062, 312, 401, 504, 601) is arranged to disperse the entrance slit (104, 204, 232, 308, 500, 600) image into a spectrum so that each wavelength of the spectrum forms an image of its own from the entrance slit (104, 204, 232, 308, 500, 600), the place of the image on the micromirror elements of the optical DMD modulator (108, 210, 238, 318, 406, 510, 604) depending on the wavelength;

the optical DMD modulator (108, 210, 238, 318, 406, 510, 604) is arranged to modulate the dispersed entrance slit (104, 204, 232, 308, 500, 600) image with at least one micromirror element of the optical DMD modulator (108, 210, 238, 318, 406, 510, 604) to form at least one wavelength band modulated from the entrance slit (104, 204, 232, 308, 500, 600) image;

the dispersive component (106, 2062, 312, 401, 504, 605) is arranged to compose non-dispersive measurement radiation from at least one modulated wavelength band so that when the image is formed at all different wavelengths, the entrance slit (104, 204, 232, 308, 500, 600) images are formed in the same place regardless of the wavelength;

the imaging component (106, 206, 234, 314, 402, 506, 516, 606) is arranged to image the entrance slit (104, 204, 232, 308, 500, 600) to the exit slit (104, 214, 242, 322, 514) by means of measurement radiation;

the only detector (110, 216, 244, 326, 424) of the spectrometer is arranged to detect measurement radiation from the exit slit (104, 214, 242, 322, 514) and to convert the measurement radiation into an electrical measurement signal; and

for spectrum measurement the spectrometer is arranged to demodulate the electrical measurement signal to separate signal components formed by different wavelength bands from one another and to measure at least one wavelength band with at least one signal component.

16. A spectrometer according to claim 15, **c h a r a c t e r i z e d** in that the spectrometer is arranged to illuminate the entrance slit (104, 204, 232,

308, 500, 600) with the optical radiation emitted by a sample (102, 202, 230, 304).

17. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to illuminate the sample (102, 202, 230, 304) with measurement radiation and to image the measurement radiation emitted by the sample (102, 202, 230, 304) to the exit slit (104, 214, 242, 322, 514).

18. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to modulate optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time so that different wavelength bands are modulated with different waveforms and the spectrometer is arranged to separate different wavelength bands from one another with demodulation corresponding to the modulation.

19. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to modulate optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time so that different wavelength bands are multiplexed using time division and the spectrometer is arranged to separate different wavelength bands from one another with demodulation corresponding to the modulation.

20. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to modulate optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time so that different wavelength bands are multiplexed using frequency division and the spectrometer is arranged to separate different wavelength bands from one another with demodulation corresponding to the modulation or with filtering.

21. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to modulate optical properties of the elements of the optical modulator (108, 210, 238, 318, 406, 510, 604) as a function of time so that different wavelength bands are multiplexed using code division and the spectrometer is arranged to separate different wavelength bands from one another with demodulation corresponding to the modulation.

22. A spectrometer according to claim 15, **characterized** in that the spectrometer comprises only one dispersive component (106, 2062, 312, 401, 504, 601).

23. A spectrometer according to claim 15, **characterized** in that the spectrometer is produced for one integrated circuit.

24. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to determine the concentration of at least one substance in the sample (102, 202, 230, 304) by means of at least one measured wavelength band.

25. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to determine the thickness of a substance layer in the sample (102, 202, 230, 304) by means of at least one measured wavelength band.

26. A spectrometer according to claim 15, **characterized** in that the spectrometer is arranged to determine the sample (102, 202, 230, 304) temperature by means of at least one measured wavelength band.

27. A spectrometer according to claim 15, **characterized** in that the detector (110, 216, 244, 326, 424) is the exit slit (104, 214, 242, 322, 514).

28. A spectrometer according to claim 15, **characterized** in that the spectrometer is produced for an integrated circuit.

29. A spectrometer according to claim 15, **characterized** in that the spectrometer is produced using a plane waveguide, LIGA technique and moulded plastic optics.